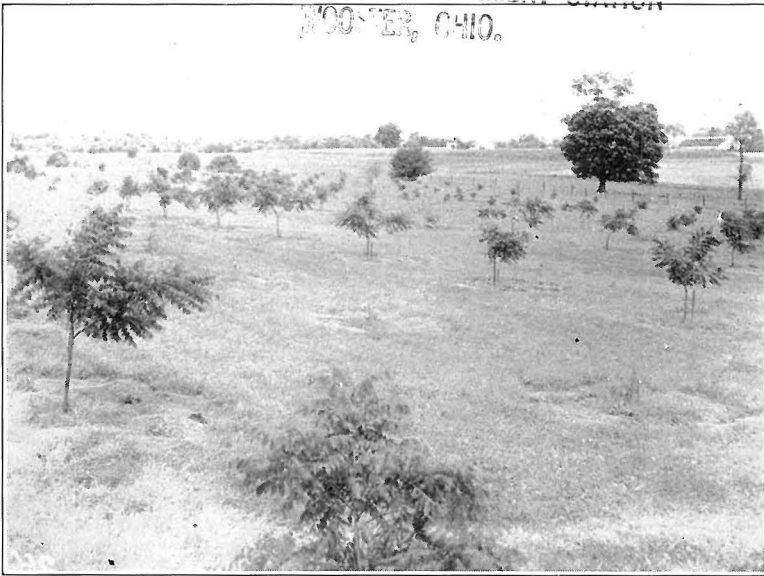


TOP-WORKING and BENCH-GRAFTING

# Walnut Trees



Nut orchard—Mahoning County Experiment Farm

OHIO AGRICULTURAL EXPERIMENT STATION  
WOOSTER, OHIO

# TOP-WORKING AND BENCH-GRAFTING WALNUT TREES

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Seedling black walnut trees which produce nuts of superior cracking and dessert qualities are being discovered frequently in many localities in Ohio. Many of these high-quality seedling nut trees are being tried at the Mahoning County Experiment Farm.

It is necessary to propagate these trees by means of grafting. This propagation is being done in two ways: (1) by top-grafting on seedling black walnut trees previously planted in permanent locations in the nut orchard and (2) by bench-grafting on small seedlings indoors during the winter.

English walnuts of known or promising hardiness are also being top-worked on black walnut trees.

It is the purpose of this circular to present a brief description of some methods of grafting practiced in the course of the establishment of this trial nut orchard.

Illustrations of the important steps in top-grafting nut trees out-of-doors and by bench-grafting indoors are presented with short comments on the procedure.

## TREATMENT OF GRAFTING WOOD

Grafting nut trees, even under favorable conditions, is generally more difficult than grafting fruit trees, and it is highly important that both stock and scion be in the best possible condition. Best results are obtained when it is possible to set the scions immediately after they are taken from the tree. If the scion wood has to be stored for some time before grafting, then it should be wrapped with waxed paper or covered with paraffin and placed in a box containing moistened peat moss or some similar material which will retain moisture. The box is then stored in a moist, cool place. The temperatures and humidity prevailing in refrigerated fruit storages are favorable for keeping grafting wood.

Growth made during the past season is used for propagating wood. When the scions are transferred immediately from the original to the top-worked tree, it is well to discard the terminal buds and depend upon some of the dormant buds further back on the new growth. Even though the scions are to be set within a short period after being cut, it is a good policy to keep them covered with waxed paper or a moistened cloth. Evaporation is frequently high during May, when most of the top-working is done.

## TOP-WORKING METHODS

A number of different types of grafting is employed in top-working seedling nut trees which already have been established in a permanent location. The kind of graft used is determined by the size of the branch being worked, the location of the graft on the tree, and to some extent by the preference of the operator.

The ordinary cleft graft is probably used more than any other, although the whip graft and the side graft also frequently are employed. The type of graft used is generally of less importance than the condition of scion and stock and the care exercised in doing the grafting. The important thing about setting the scion is to make sure that the cambium layer of scion and stock are in contact over the maximum distance. Large wounds should be avoided. Thus it may be necessary in top-working larger trees to graft many small limbs instead of setting a single scion in each of the main scaffold branches.

## WRAPPING THE GRAFT

After the scions are in place the union should be wrapped with tape to hold it in place and also to shield the cambium from direct contact with the wax.

Various kinds of tape may be used for this purpose, such as commercial grafting tape, narrow strips of muslin, or surgeon's adhesive tape. The latter material is preferable. It is convenient to handle and permits the operator to exert considerable pressure in the process of wrapping the union. This material usually will deteriorate fast enough to avoid constriction or girdling.

Side grafts—that is, scions which are inserted in the side of the central leader or main branch—should be secured by using small nails.

## WAXES

Waxes are used to seal the wound made in the process of grafting and to prevent the scion from drying out. The entire area around the union, the tape and the scion, is covered with wax. Many kinds of wax are available for this purpose. The ordinary grafting wax made by combining tallow, resin, and beeswax may be used. However, in the work illustrated in this circular melted paraffin has been used almost exclusively. The paraffin is kept melted in a grafting lantern heated by an oil or alcohol lamp and applied with a narrow paint brush. A little experience is required to determine the proper temperature for the wax. The wax should be hot enough so that when it is spread it will leave an almost invisible film. If the wax is too cool the covering will be whitish.

The chief advantage in the paraffin wax is that it is much more convenient to apply than the more sticky types of wax. There is a decided advantage if the operator can keep his hands reasonably clean while he is doing the grafting. Paraffin wax does not adhere to the hands as does the regular grafting waxes and it is much more readily removed.

## BOXING OFF THE GRAFT

The technique employed in top-working nut trees is basically the same as that used with fruit trees. However, the percentage of scions which grow is generally much lower on nut trees. Part of this difficulty is due to what is termed "flooding" or "choking" of the scion. Growth on nut trees starts relatively late in the spring, but under average weather conditions in Ohio the growth is very rapid once it is started. This rapid growth of the stock causes an excessive flow of sap which prevents the union of scion and stock.

In order to overcome this difficulty it has been the practice in the top-working illustrated in this circular to box off the area around the graft. This boxing-off plan has been practiced by W. R. Fickes of Wooster, Ohio, in grafting walnuts for a number of years. Mr. Fickes suggested that it be used in top-working the seedling trees at the Mahoning County Experiment Farm. Boxing-off is done by making use of the practice commonly known as "ringing." Where scions are set as terminal grafts, the boxing-off process is accomplished by making a cut entirely around the grafted limb one or 2 inches back of the union. This boxing-off or ringing may consist of a single cut or score around the stock, made with a knife, or a narrow strip of bark may be removed. Boxing-off will restrict the flow of sap temporarily but will leave no permanent injury. The resulting wound will heal within a few weeks. Fickes has found that better results are obtained where he does the boxing-off 10 days to 2 weeks in advance of the time the scions are set.

If the graft is inserted as a side graft along the main tree leader or scaffold branch, then the boxing-off process should be carried out above the graft as well as below, and in some cases additional benefit may even be derived from vertical cuts on either side of the graft so that the boxing-off may embrace a rectangular area around the graft.

The regular use of this boxing-off plan in the more recent work of top-working at the Mahoning County Experiment Farm has resulted in a high percentage of takes. The wider use of this plan by amateurs is recommended.

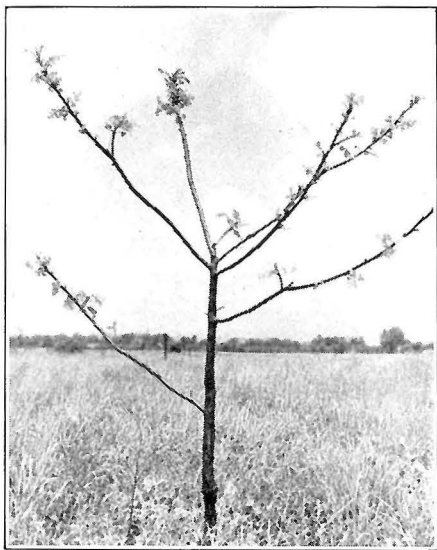


Fig. 1.—Seedling black walnut tree  
right size for top-working

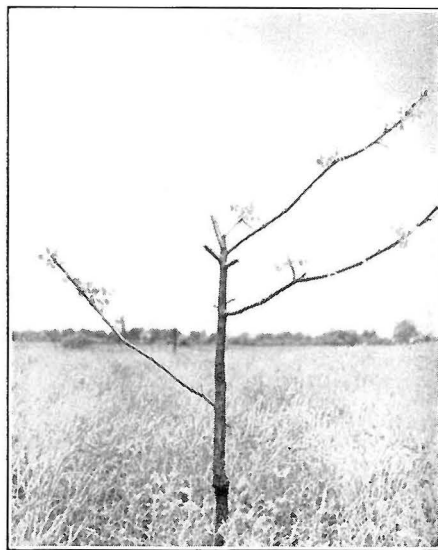


Fig. 2.—Black walnut tree after  
branches chosen for top-working  
had been cut back. Note that  
four branches were left to provide  
leaf area to assist in growth of  
scions and to promote healing of  
wounds. Same tree as shown in  
figure 1.

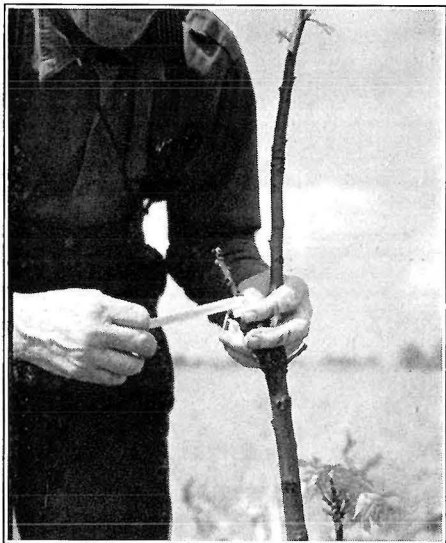


Fig. 3.—After scions are in position they are securely wrapped with adhesive tape. Tape prevents melted wax from coming in contact with cambium.

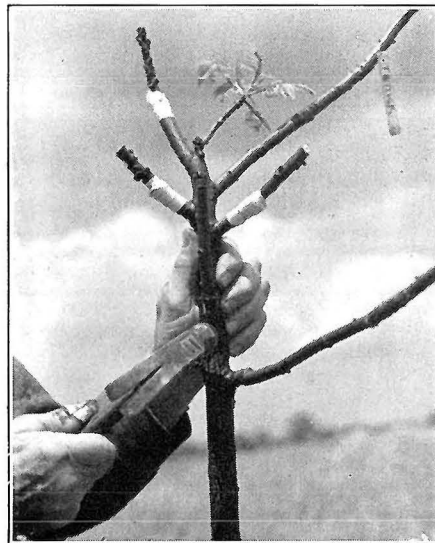


Fig. 4.—Cleft grafts are set and wrapped with tape. Side grafts are secured by small nail.



Fig. 5.—After scions are set and wrapped they are covered with melted paraffin wax



Fig. 6.—One of the most important operations in top-working walnut trees is the process of "boxing off" the graft. This is done by scoring the stock with a knife a short distance below the location of the scion

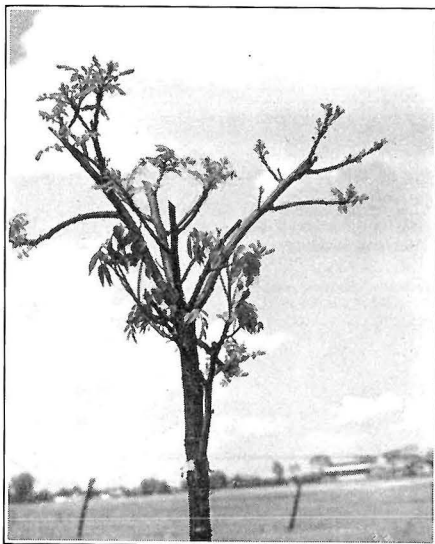


Fig. 7.—Black walnut tree 1 year after having been top-worked. Surplus branches have been removed or cut back to stubs which are used in supporting scions against breakage during second year's growth.



Fig. 8.—Showing side branch tied to stub for support. This is especially useful where side grafts are necessary



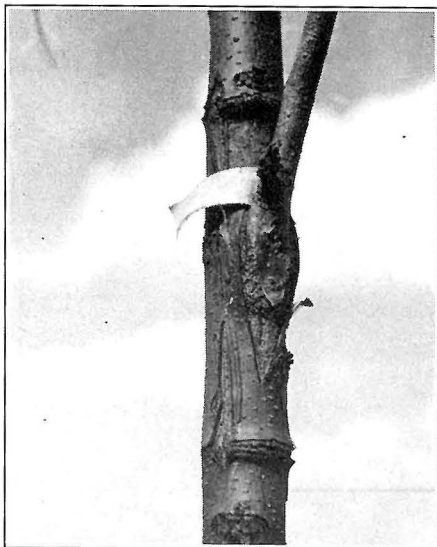


Fig. 9.—Close up of side graft 1 year after grafting. Note scars resulting from “boxing off”. Tape is still clinging to union

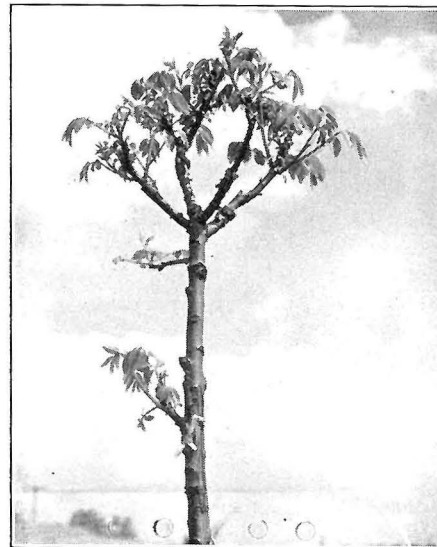


Fig. 10.—Black walnut planted as seedling in 1937, top-worked in orchard May 1942 to Crath walnut. Scions were cut and set the same day. Growth had started on the stock when scions were set. Photo taken May 31, 1943.



Fig. 11.—Top-worked black walnut tree showing 2 years' growth after top-working.



Fig. 12.—One year's growth of top-worked black walnut tree. Scions set May 26, 1942 and photo taken a year later. Length of growth 38 inches.

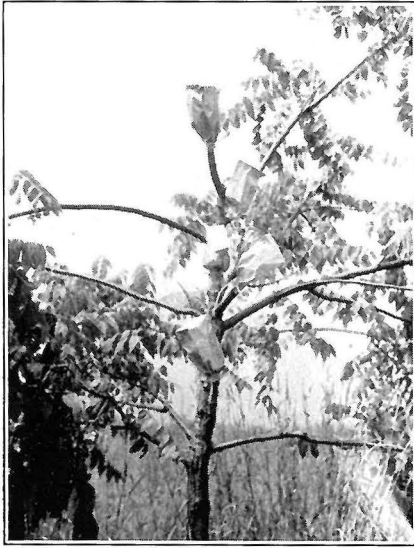


Fig. 13.—When nut trees are top-worked late in the spring it is advisable to cover the scions with paper bags until growth starts. The bags should be ventilated.



Fig. 14.—Heartnut, top-worked on black walnut seedling after two seasons' growth. The heartnut makes a very vigorous growth.

### BENCH-GRAFTING

Top-grafting trees previously planted in permanent locations has been the method used most frequently in propagating the nut orchard above described. However, a considerable number of varieties and promising seedlings also have been propagated by bench-grafting indoors during the winter months. The plan followed in bench-grafting is essentially the same as that commonly used in bench-grafting apples. Seedling trees of small diameter are used as stocks, and either the whip or splice method of grafting is used.

After the little trees are grafted, wrapped, and waxed, they are planted in deep boxes filled with fertile soil or with a mixture of peat and soil. The boxes should be placed in a greenhouse until danger of heavy frosts is past and then they may be removed to a cold frame out-of-doors. After one year in the cold frame the trees are ready to be set in a nursery row out-of-doors. After 2 years in the nursery row, black walnuts or English walnuts on black walnut stocks will be ready for planting in the permanent location. Unless one has access to a greenhouse and cold frames, the plan of planting seedling trees in permanent locations, later to be top-worked to the desired varieties, is to be preferred to bench-grafting.

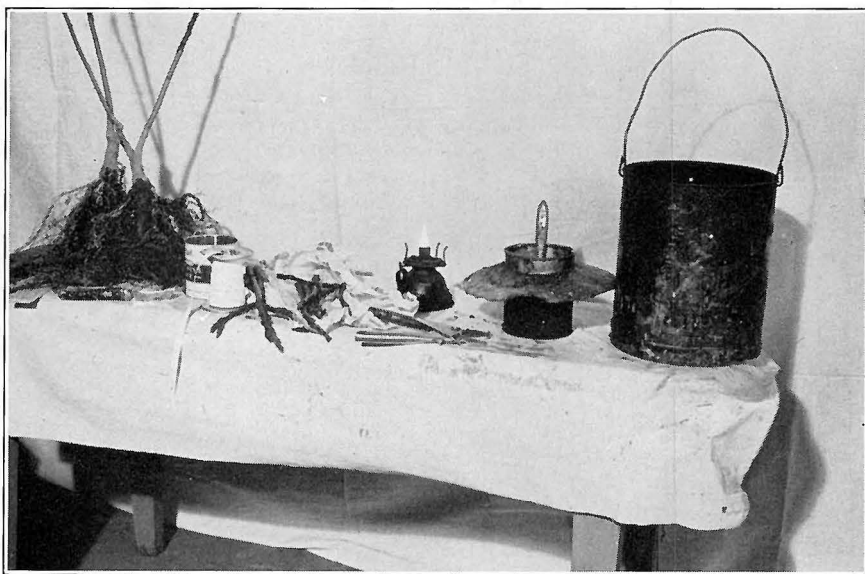


Fig. 15.—Bench-grafting: Here are the necessary supplies and equipment for bench-grafting nut trees indoors. Stock, scion, tape, grafting knife, shears, wax pot, and lantern.



Fig. 16.—A convenient arrangement of materials facilitates bench-grafting.



Fig. 17.—After the scion is inserted in the seedling stock it is securely wrapped with adhesive tape.



Fig. 18.—The entire scion, as well as the union, is covered with paraffin wax. It is necessary to have the wax hot enough that when it is spread the result is a thin transparent covering.



Fig. 19.—After the grafting is completed the stocks are planted in fertile garden soil or a mixture of peat and soil. The boxes should be deep enough so that the stock and scion can be completely covered.



Fig. 20.—The boxes containing the grafted seedlings are placed in a greenhouse until spring. The commercial hot house used in growing tomatoes provides about the right temperatures for the best results in growing bench-grafted nut trees.

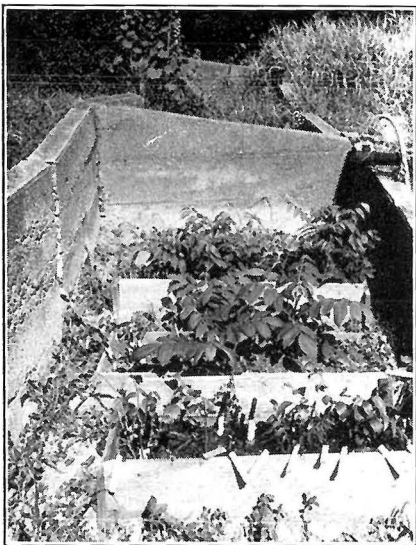


Fig. 21.—Bench-grafted nut trees are transferred to the cold frame in the spring and kept there for the first year. At the beginning of the second year they are planted in the nursery row.

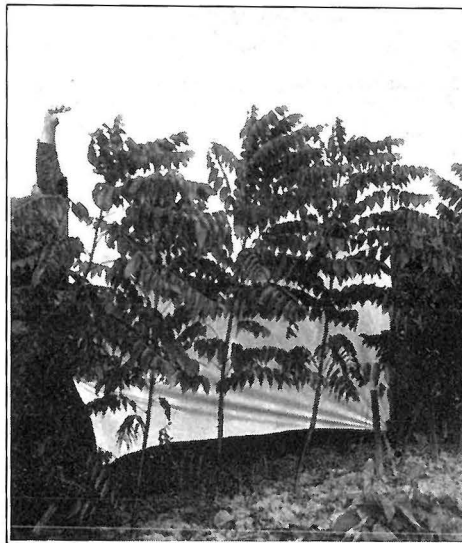


Fig. 22.—Black walnut grafted on seedling after 2 years' growth in nursery row. Ready for planting in permanent location.